

PATENT ABSTRACTS OF JAPAN

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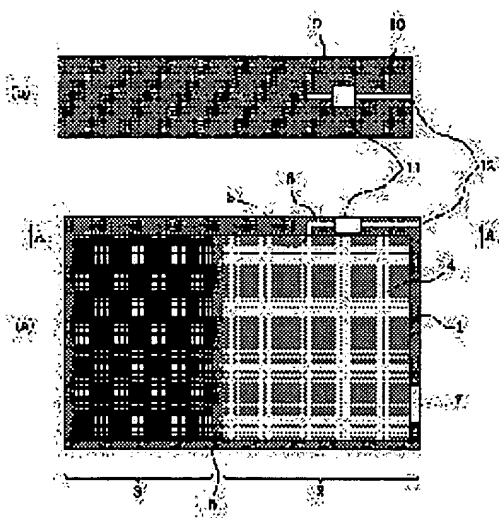
(54) INK CARTRIDGE

(57)Abstract:

PURPOSE: To reduce the possibility of ink leakage under various conditions by communicating an atmosphere communication port with a chamber having a plurality of surfaces including the first surface communicating with an absorbing member, and opening a communicating passage at the wall of a chamber different from the first surface.

CONSTITUTION: An atmosphere communicating part 6 has an ink trap chamber 7 of a chamber for staying ink, a communicating passage 9 for communicating an atmosphere communicating inner opening 8 with a chamber 11, and a communicating passage 10 for communicating an atmosphere communicating port 12 with the chamber 11. The part 6 is provided at a wall except the wall so provided with an ink supply port as to dispose an inner opening at the position separated from a communicating part 5 and an ink supply port 7 in a negative pressure generating chamber 2 and the wall along the part 5. Even if the ink in the chamber 2 is

invaded into the passage 9 due to environmental change and moved to the passage 12, the ink can be stayed at the bottom of the chamber 11 on the way of moving. Thus, the possibility of allowing the ink to arrive at the passage 12 can be reduced.



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CLAIMS

[Claim(s)]

[Claim 1] The ink cartridge which carries out [that said atmospheric-air free passage opening and a free passage way open for free passage are carrying out opening to the wall of the aforementioned room which has the free passage way which makes atmospheric-air free passage opening which introduces atmospheric air, ** constituted by two or more fields including the 1st field which leads to said absorption member, this **, and said atmospheric-air free passage opening open for free passage in the ink cartridge which has an absorption member holding ink, and is different from said 1st field, and] as the description.

[Claim 2] It is the ink cartridge according to claim 1 which said 1st field has countered said absorber and is characterized by said wall crossing to said 1st field.

[Claim 3] It is the ink cartridge according to claim 1 which said wall has the 1st corner of 90 or less degrees, and the 2nd corner of 180 degrees or more, and is characterized by preparing said opening in said 2nd corner.

[Claim 4] Said the 1st corner and said 2nd corner are an ink cartridge according to claim 3 characterized by preparing more than one by turns.

[Claim 5] Said 1st corner is an ink cartridge according to claim 3 characterized by having the include angle in which ink is made to pile up with the surface tension of said ink.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the ink cartridge as the ink hold section used especially for ink jet record about the ink hold section which holds a liquid.

[0002]

[Description of the Prior Art] The gestalt holding ink etc. is used for porosity members, such as a gestalt which stores ink directly in a case, a gestalt which contains ink into a flexible bag, and sponge, at the ink hold section which stores the ink used for ink jet record.

[0003] And in each gestalt, external atmospheric air is introduced into ink hold circles with consumption of the ink by record, and the configuration which keeps internal pressure almost constant is adopted. This is for maintaining at a fixed condition the pressure condition of the ink delivery section prepared in the ink discharge part which carries out the regurgitation of the ink for record. Usually, this delivery section was set up lower than atmospheric pressure, and it has prevented that ink begins to leak by this.

[0004] It is common to open a hole in a case and to make the interior and the exterior open for free passage as a means of this atmospheric-air installation. When storing directly the ink mentioned above in a case, in order to prevent the ink leakage from this hole, the filter which makes only a gas penetrate must be prepared, but it is unnecessary to use a flexible bag to this.

[0005] Moreover, in storing ink by ink holding power, such as capillary tube force which a porosity member has, in the usual condition, it does not produce the ink leakage from atmospheric-air free passage opening. However, when vibration etc. was added to an ink cartridge, ink may have leaked.

[0006] For this reason, when atmospheric-air free passage opening was prepared in the ink hold section which allots a porosity member, the configuration which establishes an ink leakage prevention device was adopted as opening inside the ink hold section of the free passage way which is open for free passage to atmospheric-air free passage opening.

[0007] For example, the configuration which makes internal opening of the atmospheric-air free passage way established in the ink hold section which has a form ingredient of absorptivity which is looked at by JP,1-93365,A inside project from a wall surface is mentioned. Here, the lobe configuration was made into the shape of a cone, and the slot (it is also hereafter called a trap) for barring migration of ink is established in the perimeter.

[0008]

[Problem(s) to be Solved by the Invention] However, even if it adopted the above-mentioned configuration, when a physical vibration, an impact, etc. were added, ink might invade in the atmospheric-air free passage way. In this case, the path of an atmospheric-air free passage way is made small, and the technique of preventing leaking to an ink hold outside according to the capillary tube force, and coming out is mentioned.

[0009] However, when the ink which invaded into atmospheric-air free passage opening by the vibration accompanying a writing scan etc., and formed the meniscus thickens after long duration progress, in order to remove this ink from an atmospheric-air free passage way, remarkable differential pressure is needed.

[0010] Moreover, since an ink jet recording apparatus is used in various areas, it must make a safety factor high so that ink leakage may not be produced under a different environmental condition from the area which produced the ink cartridge which is the ink hold section, and must make a strong thing the capillary tube force in an atmospheric-air free passage way.

[0011] This has high possibility that the open air can be introduced through atmospheric-air free passage opening if the pressure of ink hold circles will not be in a quite low condition compared with the exterior as a result, and the pressure condition of the delivery section will become unstable.

[0012] Moreover, when ink begins to have bled from a porosity member by environmental temperature change which is seen at the time of the PD, an allobar, etc., ink invaded in an atmospheric-air free passage way by the vibration under transportation etc., and the seal prepared in opening of an ink cartridge etc. for ink leakage prevention was removed, ink may have leaked.

[0013] And ink began to bleed from atmospheric-air free passage opening, and such ink leakage had a possibility of having soiled a hand or soiling equipment, when a user took an ink cartridge in his hand or an ink jet recording device was equipped with it.

[0014] This invention aims at making lower possibility that the ink leakage from atmospheric-air free passage opening under terms and conditions will arise, in view of the above-mentioned technical problem.

[0015]

[Means for Solving the Problem] In the ink cartridge which has an absorption member holding ink in order that this invention may attain the above-mentioned purpose Atmospheric-air free passage opening which introduces atmospheric air, and ** constituted by two or more fields including the 1st field which leads to said absorption member, It has the free passage way which makes this ** and said atmospheric-air free passage opening open for free passage, and the configuration in which said atmospheric-air free passage opening and a free passage way open for free passage are carrying out opening to the wall of the different aforementioned room from said 1st field is proposed.

[0016] Moreover, in addition to the above-mentioned configuration, said 1st field has countered said absorber and said opening proposes the configuration with which the configuration which said wall intersects to said 1st field, or said wall has the 1st corner of 90 or less degrees, and the 2nd corner of 180 degrees or more, and is prepared in said 2nd corner.

[0017] And the configuration which said the 1st corner and said 2nd corner prepare by turns, and said 1st corner also propose the configuration which has the include angle in which ink is made to pile up with the surface tension of said ink to the above-mentioned configuration.

[0018]

[Function] Even if ink oozes from an absorption member by an environmental variation etc. by using an above-mentioned configuration, it can prevent that the ink invades into atmospheric-air free passage opening directly.

[0019]

[Example] Hereafter, this invention is explained to a detail using drawing. In addition, the element which attached the same sign in drawing shall have the same function.

[0020] (The 1st example) The ink hold section which has the atmospheric-air free passage structure as the 1st example concerning this invention in drawing 1 is shown. In this example, the ink hold section has taken the gestalt of a removable ink cartridge to the discharge part which carries out the regurgitation of the ink.

[0021] In drawing 1, 1 is an ink cartridge body and the ink cartridge 1 is taken as the configuration divided into the negative pressure generating room 2 for adjusting the pressure condition of a discharge part for the interior, and the ink reservoir room 3 which stores ink.

[0022] Here, drawing 1 (a) is the sectional view of an ink cartridge 1, and drawing 1 (b) is an A-A sectional view in drawing 1 (a).

[0023] The absorption member 4 holding ink is allotted in this negative pressure generating room 2, ink forms a meniscus with a vesicular structure and this absorption member 4 can generate negative pressure. Moreover, the ink feed hopper 7 for supplying ink to the atmospheric-air free passage section 6 and the exterior is formed in the negative pressure generating room 2.

[0024] And the negative pressure generating room 2 and the ink reservoir room 3 lead by the free passage section 5, supply ink to the ink feed hopper 7 of the ink reservoir room 3 to the negative pressure generating room 2 through this free passage section 5, are one side and introduce into the ink reservoir interior of a room the atmospheric air introduced in the negative pressure generating room 2 from the atmospheric-air free passage section 6.

[0025] the ink trap room 7 which is ** for the atmospheric-air free passage section 6 to make ink pile up in this example, and an atmospheric-air free passage -- business -- it consists of a free passage way 9 which makes the internal opening 8 and ** 11 open for free passage, and a free passage way 10 which makes the atmospheric-air free passage opening 12 and ** 11 open for free passage. In addition, ** 11 and the free passage ways 9 and 10 are established in the interior of the wall which constitutes an ink cartridge 1 as shown in drawing 1. It is desirable to prepare

in walls other than the wall with which the ink feed hopper is prepared, and the wall in alignment with the free passage section 5 so that the internal opening 8 may be located in the location distant from the free passage section 5 and the ink feed hopper 7 in the negative-pressure generating room 2 as a location in which the atmospheric-air free passage section 6 is formed, and it is most desirable to prepare in the wall which counters the wall surface which meets the free passage section as shown in drawing 1 (a).

[0026] Even if the ink in the negative pressure generating room 2 invades in the free passage way 9 by an environmental variation etc. and it moves to the atmospheric-air free passage opening 12 side by adopting an above-mentioned configuration, ink can be made to pile up in the middle of the migration at the pars basilaris ossis occipitalis of the trap room 11. Thereby, possibility that ink will reach is made with a low thing to the atmospheric-air free passage opening 12.

[0027] Moreover, as shown in drawing 1, even if an ink cartridge is laid with the posture of arbitration by considering as the central field of a wall surface where the location of opening of the free passage way 9 in ** and the free passage way 10 is established in opening, it becomes possible to make ink pile up. Since the direction of the corner of ** 11 tends to pile up with the surface tension of ink etc., this is also offering the structure ink's being unable to invade more easily in the free passage way 10 from the wall surface in which opening is prepared.

[0028] (The 2nd example) The ink cartridge as the ink hold section which has the atmospheric-air free passage structure as the 2nd example concerning this invention in drawing 2 is shown. Although the configuration of this example does not change the part about the negative pressure generating room 2 and the ink reservoir room 3 to the 1st example mentioned above, the free passage conditions of the ** 11 of the atmospheric-air free passage section and the negative pressure generating room 3 which were established in Kabeuchi of an ink cartridge differ.

[0029] Here, drawing 2 (a) is the sectional view of the ink cartridge of this example, and drawing 2 (b) is a B-B sectional view in drawing 2 (a).

[0030] In this invention, it has the composition of preventing ink trespassing upon the free passage way itself which opens ink for free passage to the atmospheric-air free passage opening 12. When ink trespasses upon a thin atmospheric-air free passage way, the ink may thicken this. When ink thickens in an atmospheric-air free passage way and migration of ink becomes difficult, the negative pressure at the time of ink supply becomes high, and there is a possibility that the pressure of the discharge part for carrying out the regurgitation of the ink may separate from the predetermined pressure range which can maintain high record grace.

[0031] Therefore, in this example, it changes to the configuration which forms the free passage way 9 which makes the internal opening 8 and ** 11 open for free passage in the above-mentioned example, one wall surface of ** 11 is made into an open condition, and it is considering as the configuration which faces the absorption member 4.

[0032] This ** 11 also has the effectiveness of a buffer room of preventing the ink which oozed from the absorption member 4 by internal pressure change in an ink cartridge trespassing upon the atmospheric-air free passage way 10 immediately in addition to the ink trap effectiveness of ** 7 of the above-mentioned example.

[0033] Drawing 3 shows the condition that ink oozed to the amount of extent which can form a meniscus in ** 11. Drawing 3 (a) is the expanded sectional view showing the condition that ink invaded into the atmospheric-air free passage section 6 shown in drawing 2 (a), and a C-C sectional view [in / in drawing 3 (b) / drawing 3 (a)] and drawing 3 (c) are the D-D sectional views in drawing 3 (a).

[0034] In this example, as shown in drawing 3 (b), the corner of ** 11 turns into the ink trap section. This is for ink to tend to form a meniscus in the central field of the wall surface which constitutes ** 11 in a corner compared with what ink 14 cannot adhere to easily due to surface tension. And while forming the opening 13 by the side of ** 11 of the atmospheric-air free passage way 10 in the wall surface which does not counter the absorption member 4 so that it may not trespass upon an atmospheric-air free passage way easily even if it receives vibration after ink has oozed from the absorption member 4 as shown in drawing 3 (a) and (c), it has prepared in the center section of a wall.

[0035] A meniscus is made to form in the ink trap part of the corner of ** 11 like drawing 3 by adopting an above-mentioned configuration at ink. By vibration, fall, the thermal shock, and the temperature change Since the probability for ink to invade in the atmospheric-air free passage way 10 is made with a low thing even if ink oozes from the absorption member 4 which holds ink for negative pressure adjustment and ink adheres to the wall of ** 11 Ink can reach the atmospheric-air free passage opening 12, and possibility that ink will leak as a result can be made lower.

[0036] (Other examples) Although the configuration of the ink trap rooms 7 and 11 was made into parallel 6 face piece and the include angle of a corner 15 was used as the right angle in the above-mentioned example, it is good also as a configuration which makes the cross-section configuration which does not restrict to this and is shown in drawing 4 .

[0037] Drawing 4 (a) has the composition of having established the corner of the acute angle used as the ink trap section in the both sides of the location which counters opening in ** 11 of the atmospheric-air free passage way 10, and opening. Moreover, drawing 4 (b) establishes the corner which makes an acute angle in the location which counters opening of the atmospheric-air free passage way 10, and the other wall surface is constituted by the curved surface of loose curvature. And drawing 4 (c) prepared the corner of two or more acute angles, and it has prepared the corner of an acute angle so that opening of the free passage way 10 may not be directly countered like the 2nd above-mentioned example. The corner of an acute angle is prepared also near the opening.

[0038] If the configuration of the ink trap part of ** 11 of the atmospheric-air free passage section is made into the configuration in which the include angle E of at least one corner has an include angle smaller than 90 degrees, this ink will make a meniscus in the corner of an acute angle, and it will become easy to bar migration of ink. Thereby, the ink leakage from the atmospheric-air free passage regio oralis can be prevented. On the other hand, since the include angle F of the part in which internal opening of the atmospheric-air free passage way 10 is prepared is made into 180 degrees or more, adhesion of ink has been prevented effectively.

[0039] It becomes the configuration that ink cannot reach internal opening easily, further by making opening project to the central site of ** 11 as a suitable example, as shown in drawing 4 (c), and preparing the corner of an acute angle so that this may be adjoined.

[0040] As mentioned above, it cannot be overemphasized that, as for the include angle of the corner established in an ink trap room and a ** buffer room, various idea **** will set up a suitable include angle and suitable spacing, the number formed from surface tension, viscosity, etc. of the ink held in an ink cartridge.

[0041] Hereafter, the equipment with which an above-mentioned ink cartridge is used is explained.

[0042] Drawing 5 is an outline perspective view as an example of ink jet machine ***** which can carry the ink cartridge 1 concerning this invention, 1 is an ink cartridge which is the ink hold

section mentioned above, and HC is carriage which holds an ink cartridge 1 and the record head cartlidge 5001 which is a record means to have an ink discharge part removable.

[0043] 5004 is a leading screw for making Carriage HC scan to the recorded media 5006, such as detail paper and plastics sheet metal, and 5003 is a guide rail for guiding the scan of Carriage HC. Here, a leading screw 5004 is interlocked with the forward inverse rotation of a drive motor 5013 through gears 5009 and 5011, and since it is engaging with the engagement section which is not illustrated [by which the spiral slot 5005 minced by the leading screw 5004 was further established in Carriage HC], the scan of Carriage HC will be performed to the longitudinal direction of equipment by the drive of a drive motor 5013. And a recorded material 5006 is conveyed by the platen roller 5000.

[0044] Moreover, the conveyance field of a recorded material 5006 is adjoined and the recovery means of a discharge part is established. This recovery means consists of a suction means 5012 which carries out suction recovery of the discharge part through internal opening (un-illustrating) prepared in the cap member 5002 and this cap member 5002 for carrying out capping of the delivery section (un-illustrating) of said record head cartlidge. Driving force is transmitted to this suction means from a drive motor 5013 by well-known means of communication, such as a gear 5010 and a change clutch.

[0045] Furthermore, not only recovery of the blinding of a delivery etc. but by changing the amount of suction, it makes the ink from an ink cartridge to a discharge part discharge, and above-mentioned suction recovery can remove detailed dust, detailed air bubbles, etc. from the inside not only of the filter section but ink passage. Recovery of this ink passage is compulsorily performed, when it is judged periodically that a user is required, and it becomes possible [maintaining good printing grace].

[0046] Each processing of the above-mentioned capping and suction recovery will be performed in each correspondence location, when Carriage HC comes to the field by the side of a home position. And using well-known timing and a well-known sequence, these the processings of each are the modes of arbitration and are carried out independently or complexly.

[0047]

[Effect of the Invention] Though ink begins to bleed from the member which holds ink by an environmental variation etc. by adopting the configuration of this invention as explained above, since the device in which ink is made to pile up in the atmospheric-air free passage section is established, possibility that ink will reach is made with a low thing to atmospheric-air free passage opening prepared in the outside surface of an ink cartridge.

[0048] Moreover, even if an ink cartridge is laid with the posture of arbitration, it becomes possible to make ink pile up.

[0049] And even if ink oozes from the absorption member which holds ink for negative pressure adjustment and ink adheres to the wall of ** for an ink trap by vibration, fall, the thermal shock, and the temperature change Since the probability for ink to invade in the atmospheric-air free passage way which is open for free passage to atmospheric-air free passage opening is made with a low thing, possibility of ink leaking from atmospheric-air free passage opening of an ink cartridge, and soiling a perimeter can be made lower.

TECHNICAL FIELD

[Industrial Application] This invention relates to the ink cartridge as the ink hold section used especially for ink jet record about the ink hold section which holds a liquid.

PRIOR ART

[Description of the Prior Art] The gestalt holding ink etc. is used for porosity members, such as a gestalt which stores ink directly in a case, a gestalt which contains ink into a flexible bag, and sponge, at the ink hold section which stores the ink used for ink jet record.

[0003] And in each gestalt, external atmospheric air is introduced into ink hold circles with consumption of the ink by record, and the configuration which keeps internal pressure almost constant is adopted. This is for maintaining at a fixed condition the pressure condition of the ink delivery section prepared in the ink discharge part which carries out the regurgitation of the ink for record. Usually, this delivery section was set up lower than atmospheric pressure, and it has prevented that ink begins to leak by this.

[0004] It is common to open a hole in a case and to make the interior and the exterior open for free passage as a means of this atmospheric-air installation. When storing directly the ink mentioned above in a case, in order to prevent the ink leakage from this hole, the filter which makes only a gas penetrate must be prepared, but it is unnecessary to use a flexible bag to this.

[0005] Moreover, in storing ink by ink holding power, such as capillary tube force which a porosity member has, in the usual condition, it does not produce the ink leakage from atmospheric-air free passage opening. However, when vibration etc. was added to an ink cartridge, ink may have leaked.

[0006] For this reason, when atmospheric-air free passage opening was prepared in the ink hold section which allots a porosity member, the configuration which establishes an ink leakage prevention device was adopted as opening inside the ink hold section of the free passage way which is open for free passage to atmospheric-air free passage opening.

[0007] For example, the configuration which makes internal opening of the atmospheric-air free passage way established in the ink hold section which has a form ingredient of absorptivity which is looked at by JP,1-93365,A inside project from a wall surface is mentioned. Here, the lobe configuration was made into the shape of a cone, and the slot (it is also hereafter called a trap) for barring migration of ink is established in the perimeter.

EFFECT OF THE INVENTION

[Effect of the Invention] Though ink begins to bleed from the member which holds ink by an environmental variation etc. by adopting the configuration of this invention as explained above, since the device in which ink is made to pile up in the atmospheric-air free passage section is established, possibility that ink will reach is made with a low thing to atmospheric-air free passage opening prepared in the outside surface of an ink cartridge.

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possible to make ink pile up.

[0049] And even if ink oozes from the absorption member which holds ink for negative pressure adjustment and ink adheres to the wall of ** for an ink trap by vibration, fall, the thermal shock, and the temperature change Since the probability for ink to invade in the atmospheric-air free passage way which is open for free passage to atmospheric-air free passage opening is made with a low thing, possibility of ink leaking from atmospheric-air free passage opening of an ink cartridge, and soiling a perimeter can be made lower.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, even if it adopted the above-mentioned configuration, when a physical vibration, an impact, etc. were added, ink might invade in the atmospheric-air free passage way. In this case, the path of an atmospheric-air free passage way is made small, and the technique of preventing leaking to an ink hold outside according to the capillary tube force, and coming out is mentioned.

[0009] However, when the ink which invaded into atmospheric-air free passage opening by the vibration accompanying a writing scan etc., and formed the meniscus thickens after long duration progress, in order to remove this ink from an atmospheric-air free passage way, remarkable differential pressure is needed.

[0010] Moreover, since an ink jet recording apparatus is used in various areas, it must make a safety factor high so that ink leakage may not be produced under a different environmental condition from the area which produced the ink cartridge which is the ink hold section, and must make a strong thing the capillary tube force in an atmospheric-air free passage way.

[0011] This has high possibility that the open air can be introduced through atmospheric-air free passage opening if the pressure of ink hold circles will not be in a quite low condition compared with the exterior as a result, and the pressure condition of the delivery section will become unstable.

[0012] Moreover, when ink begins to have bled from a porosity member by environmental temperature change which is seen at the time of the PD, an allobar, etc., ink invaded in an atmospheric-air free passage way by the vibration under transportation etc., and the seal prepared in opening of an ink cartridge etc. for ink leakage prevention was removed, ink may have leaked.

[0013] And ink began to bleed from atmospheric-air free passage opening, and such ink leakage had a possibility of having soiled a hand or soiling equipment, when a user took an ink cartridge in his hand or an ink jet recording device was equipped with it.

[0014] This invention aims at making lower possibility that the ink leakage from atmospheric-air free passage opening under terms and conditions will arise, in view of the above-mentioned technical problem.

MEANS

[Means for Solving the Problem] In the ink cartridge which has an absorption member holding ink in order that this invention may attain the above-mentioned purpose Atmospheric-air free passage opening which introduces atmospheric air, and ** constituted by two or more fields

including the 1st field which leads to said absorption member, It has the free passage way which makes this ** and said atmospheric-air free passage opening open for free passage, and the configuration in which said atmospheric-air free passage opening and a free passage way open for free passage are carrying out opening to the wall of the different aforementioned room from said 1st field is proposed.

[0016] Moreover, in addition to the above-mentioned configuration, said 1st field has countered said absorber and said opening proposes the configuration with which the configuration which said wall intersects to said 1st field, or said wall has the 1st corner of 90 or less degrees, and the 2nd corner of 180 degrees or more, and is prepared in said 2nd corner.

[0017] And the configuration which said the 1st corner and said 2nd corner prepare by turns, and said 1st corner also propose the configuration which has the include angle in which ink is made to pile up with the surface tension of said ink to the above-mentioned configuration.

OPERATION

[Function] Even if ink oozes from an absorption member by an environmental variation etc. by using an above-mentioned configuration, it can prevent that the ink invades into atmospheric-air free passage opening directly.

EXAMPLE

[Example] Hereafter, this invention is explained to a detail using drawing. In addition, the element which attached the same sign in drawing shall have the same function.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] (a) and (b) are the sectional view of the ink cartridge as the 1st example concerning this invention.

[Drawing 2] (a) and (b) are the sectional view of the ink cartridge as the 2nd example concerning this invention.

[Drawing 3] (a), (b), and (c) are an expanded sectional view at the time of ink invading into the atmospheric-air free passage section shown in drawing 2 .

[Drawing 4] (a), (b), and (c) are the sectional view having shown the configuration of other atmospheric-air free passage sections concerning this invention.

[Drawing 5] The outline perspective view showing an example of the ink jet recording device which can apply this invention

[Description of Notations]

1 Ink Cartridge

2 Negative Pressure Generating Room

3 Ink Reservoir Room

4 Absorption Member

5 Free Passage Section
6 Atmospheric-Air Free Passage Section
7 Ink Feed Hopper
8 Internal Opening
9 Free Passage Way
10 Free Passage Way
11 **
12 Atmospheric-Air Free Passage Opening
13 Opening
14 Ink
5000 Platen Roller
5001 Record Head Cartridge
5002 Cap Member
5004 Leading Screw
5005 Spiral Slot
5006 Recorded Material
5009 Gear
5011 Gear
5012 Suction Means
5013 Drive Motor
HC Carriage

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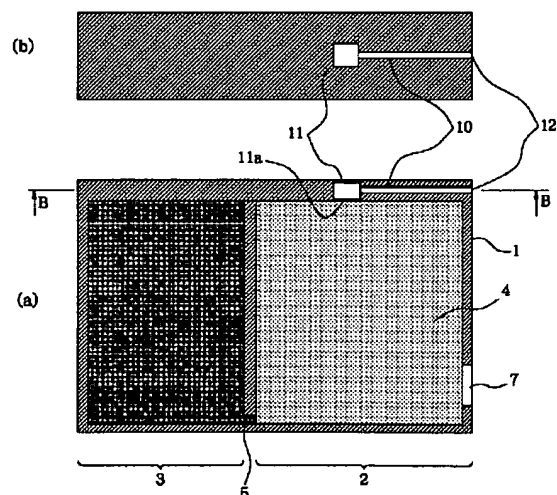
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(54) 【発明の名称】 インクカートリッジ

(57) 【要約】

【目的】 環境温度変化等によりインク収容部の内部状態が変化しても、インク収容部に設けられた大気連通口からのインク漏れが生じる可能性をより低くすることを目的とする。

【構成】 インクを保持する吸収部材を有するインクカートリッジにおいて、大気を導入する大気連通口と、前記吸収部材に通じる第1の面を含む複数の面により構成される室と、該室と前記大気連通口とを連通させる連通路と、を有し、前記第1の面と異なる前記室の壁部に前記大気連通口と連通する連通路が開口している。



【特許請求の範囲】

【請求項1】 インクを保持する吸収部材を有するインクカートリッジにおいて、大気を導入する大気連通口と、前記吸収部材に通じる第1の面を含む複数の面により構成される室と、該室と前記大気連通口とを連通させる連通路と、を有し、前記第1の面と異なる前記室の壁部に前記大気連通口と連通する連通路が開口していることを特徴とするインクカートリッジ。

【請求項2】 前記第1の面は前記吸収体に対向しており、前記壁部は前記第1の面に対して交差することを特徴とする請求項1に記載のインクカートリッジ。

【請求項3】 前記壁部は、90度以下の第1の角部と180度以上の第2の角部を有しており、前記開口は前記第2の角部に設けられていることを特徴とする請求項1に記載のインクカートリッジ。

【請求項4】 前記第1の角部と前記第2の角部は交互に複数設けられることを特徴とする請求項3に記載のインクカートリッジ。

【請求項5】 前記第1の角部は、前記インクの表面張力によりインクを滞留させる角度を有することを特徴とする請求項3に記載のインクカートリッジ。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、液体を収容するインク収容部に関し、特にインクジェット記録に用いられるインク収容部としてのインクカートリッジに関する。

【0002】

【従来の技術】インクジェット記録に用いられるインクを貯留するインク収容部には、インクを筐体内に直接貯留する形態、可撓性の袋にインクを収納する形態、スポンジ等の多孔質部材にインクを保持する形態などが用いられている。

【0003】そして、それぞれの形態において記録によるインクの消費に伴ってインク収容部内に外部大気を導入し、内圧をほぼ一定に保つ構成が採用されている。これは、記録のためにインクを吐出するインク吐出部に設けられたインク吐出部の圧力状態を一定の状態に保つためである。通常、この吐出部は大気圧よりも低く設定され、これによりインクが漏れ出すのを防止している。

【0004】この大気導入の手段としては、筐体に孔を開けて内部と外部とを連通させるのが一般的である。前述したインクを筐体内に直接貯留する場合には、この孔からのインク漏れを防止するために気体のみを透過させるフィルター等を必ず設けなければならないが、これに対して可撓性袋を用いる場合には必要ない。

【0005】また、多孔質部材の有する毛細管力などの

インク保持力によりインクを貯留する場合には、通常の状態では大気連通口からのインク漏れは生じない。しかしながら、インクカートリッジに対して振動等が加わった場合にはインクが漏れる可能性があった。

【0006】このため、多孔質部材を配するインク収容部に大気連通口を設ける場合には、大気連通口に連通する連通路のインク収容部内部の開口部にインク漏れ防止機構を設ける構成を採用していた。

【0007】例えば、特開平1-93365号公報に見られるような吸収性のフォーム材料を内部に有するインク収容部に設けられた大気連通路の内部開口部を壁面より突出させる構成が挙げられる。ここでは、その突出部形状を円錐状とし、その周囲にインクの移動を妨げるための溝（以下、トラップとも称す）を設けている。

【0008】

【発明が解決しようとする課題】しかし、上述の構成を採用しても、物理的な振動、衝撃等が加えられた場合に大気連通路内にインクが侵入することがあった。この場合、大気連通路の径を小さくして毛細管力によりインク収容部外へ漏れ出るのを防止するという手法が挙げられる。

【0009】しかし、記録走査に伴う振動等で大気連通口に侵入しメニスカスを形成したインクが長時間経過後に増粘した場合等において、このインクを大気連通路から除去するためには、かなりの圧力差が必要となる。

【0010】また、インクジェット記録装置は様々な地域において使用されるため、インク収容部であるインクカートリッジを生産した地域とは異なる環境条件下でインク漏れを生じないように安全率を高くして、大気連通路における毛細管力を強いものとしなければならない。

【0011】これは、結果的にインク収容部内の圧力が外部に比べてかなり低い状態とならないと大気連通口を介して外気を導入することができないことになり、吐出部の圧力状態が不安定になる可能性が高い。

【0012】また、物流時に見られるような環境温度変化や、気圧変化等により多孔質部材からインクがにじみ出し、輸送中の振動等で大気連通路内にインクが侵入した場合には、インク漏れ防止のためにインクカートリッジの開口部等に設けられたシールを取り除いたときにインクが漏れる可能性があった。

【0013】そして、このようなインク漏れは、インクカートリッジをユーザーが手に取ったり、インクジェット記録装置に装着する場合に、大気連通口からインクがにじみ出し、手を汚したり、装置を汚したりする虞があった。

【0014】本発明は、上記課題に鑑み、諸条件下での大気連通口からのインク漏れが生じる可能性をより低くすることを目的とする。

【0015】

【課題を解決するための手段】本発明は上記目的を達成

するために、インクを保持する吸収部材を有するインクカートリッジにおいて、大気を導入する大気連通口と、前記吸収部材に通じる第1の面を含む複数の面により構成される室と、該室と前記大気連通口とを連通させる連通路と、を有し、前記第1の面と異なる前記室の壁部に前記大気連通口と連通する連通路が開口している構成を提案するものである。

【0016】また、上記構成に加え、前記第1の面が前記吸収体に対向しており、前記壁部は前記第1の面に対して交差する構成、もしくは、前記壁部が、90度以下の第1の角部と180度以上の第2の角部を有しており、前記開口は前記第2の角部に設けられている構成を提案するものである。

【0017】そして、前述の構成に対し、前記第1の角部と前記第2の角部が交互に複数設ける構成、前記第1の角部が、前記インクの表面張力によりインクを滞留させる角度を有する構成もまた、提案するものである。

【0018】

【作用】上述の構成を用いることにより、環境変化等で吸収部材からインクが滲み出たとしても、大気連通口にそのインクが直接侵入することを防止できる。

【0019】

【実施例】以下、図を用いて本発明を詳細に説明する。なお、図において同一の符号を付した要素は同一の機能を有するものとする。

【0020】（第1実施例）図1に本発明に係わる第1の実施例としての大気連通構造を有するインク収容部を示す。本実施例において、インク収容部はインクを吐出する吐出部に対して着脱可能なインクカートリッジの形態を採っている。

【0021】図1において、1はインクカートリッジ本体であり、インクカートリッジ1は内部を吐出部の圧力状態を調整するための負圧発生室2と、インクを貯留するインク貯留室3とに分けた構成としている。

【0022】ここで、図1(a)はインクカートリッジ1の断面図であり、図1(b)は図1(a)中のA-A断面図である。

【0023】この負圧発生室2内にはインクを保持する吸収部材4が配されており、この吸収部材4は多孔質構造によりインクがメニスカスを形成し、負圧を発生できるものである。また、負圧発生室2には大気連通部6と、外部へインクを供給するためのインク供給口7が設けられている。

【0024】そして、負圧発生室2とインク貯留室3は連通部5によって通じており、この連通部5を介して、インク貯留室3から負圧発生室2のインク供給口7へインクを供給し、一方で、大気連通部6から負圧発生室2内に導入された大気をインク貯留室内に導入する。

【0025】本実施例においては、大気連通部6はインクを滞留させるための室であるインクトラップ室7、大

気連通用内部開口8と室11を連通させる連通路9、そして大気連通口12と室11を連通させる連通路10から構成される。なお、室11、連通路9、10は図1に示したようにインクカートリッジ1を構成する壁の内部に設けられる。大気連通部6を設ける位置としては、負圧発生室2内において、連通部5及びインク供給口7から離れた位置に内部開口8が位置するように、インク供給口が設けられている壁と、連通部5に沿っている壁以外の壁に設けることが望ましく、図1(a)に示したように連通部に沿っている壁面に対向する壁部に設けることが最も好ましい。

【0026】上述の構成を採用することにより、環境変化等で負圧発生室2内のインクが連通路9内に侵入し、大気連通口12側に移動したとしても、その移動途中にインクはトラップ室11の底部に滞留させることができる。これにより、大気連通口12にインクが到達する可能性を低いものとする。

【0027】また、図1に示したように室における連通路9及び連通路10の開口の位置を、開口が設けられる壁面の中央領域とすることにより、インクカートリッジが任意の姿勢で載置されてもインクを滞留させることが可能となる。これは、開口部が設けられている壁面よりも、室11の隅部の方がインクの表面張力等により滞留し易いので、より連通路10内にインクが侵入しにくい構造を提供することにもなる。

【0028】（第2実施例）図2に本発明に係わる第2の実施例としての大気連通構造を有するインク収容部としてのインクカートリッジを示す。本実施例の構成は、負圧発生室2及びインク貯留室3に関する部分は前述した第1実施例と変わらないが、インクカートリッジの壁内に設けられた大気連通部の室11と負圧発生室3との連通状態が異なっている。

【0029】ここで、図2(a)は本実施例のインクカートリッジの断面図であり、図2(b)は図2(a)中のB-B断面図である。

【0030】本発明においては、インクを大気連通口12に連通する連通路自体にインクが侵入するのを防止する構成となっている。これは、細い大気連通路にインクが侵入した場合に、そのインクが増粘する可能性がある。大気連通路内でインクが増粘し、インクの移動が困難になると、インク供給時の負圧が高くなり、インクを吐出するための吐出部の圧力が、高記録品位を維持可能な所定の圧力範囲から外れてしまうおそれがある。

【0031】従って、本実施例では、前述の実施例において内部開口8と室11を連通させる連通路9を設ける構成にかえて、室11の一壁面を開放状態とし、吸収部材4に面する構成としている。

【0032】この室11は、前述の実施例の室7のインクトラップ効果に加えて、インクカートリッジ内の内圧変化により吸収部材4からにじみでたインクがすぐに大

気連通路10に侵入するのを防止するバッファ室の効果も有する。

【0033】図3は、室11内にメニスカスを形成できる程度の量までインクがにじみでた状態を示している。図3(a)は図2(a)に示した大気連通路6にインクが侵入した状態を示す拡大断面図であり、図3(b)は図3(a)におけるC-C断面図、図3(c)は図3(a)におけるD-D断面図である。

【0034】本実施例においては、図3(b)に示したように室11の隅部がインクトラップ部となる。これは、室11を構成する壁面の中央領域にはインク14が表面張力により付着し難いのに比べ、隅部ではインクがメニスカスを形成しやすいためである。そして、図3(a)及び(c)に示したように、吸収部材4からインクがにじみでた状態で振動を受けても容易に大気連通路に侵入しないように、大気連通路10の室11側の開口13を吸収部材4に対向しない壁面に設けるとともに、壁の中央部に設けている。

【0035】上述の構成を採用することにより、室11の隅部のインクトラップ部分に図3のようにインクにメニスカスを形成させ、振動、落下、熱衝撃、温度変化によって、負圧調整のためにインクを保持する吸収部材4からインクがにじみで、室11の内壁にインクが付着したとしても、大気連通路10内にインクが侵入する確率を低いものとするので、大気連通路12にインクが到達し、結果としてインクが漏れる可能性をより低いものとすることができる。

【0036】(その他の実施例) 上述の実施例では、インクトラップ室7及び11の形状を平行6面体とし、隅部15の角度を直角にしたが、これに限るものではなく、図4に示す断面形状をなす構成としても良い。

【0037】図4(a)は大気連通路10の室11内の開口に対向する位置と開口の両側にインクトラップ部となる鋭角の隅部を設けた構成となっている。また、図4(b)は大気連通路10の開口に対向する位置に鋭角をなす隅部を設け、それ以外の壁面は緩やかな曲率の曲面により構成されている。そして、図4(c)は複数の鋭角の隅部を設け、前述の第2実施例と同様に連通路10の開口に直接対向しないように鋭角の隅部を設けている。開口の近傍にも鋭角の隅部を設けている。

【0038】大気連通路の室11のインクトラップ部分の形状は、少なくとも1つの隅部の角度Eが90°よりも小さい角度を持つ形状にすると、このインクが鋭角の隅部でメニスカスを作り、インクの移動を妨げやすくなる。これにより大気連通路10からのインク漏れが防止できる。一方、大気連通路10の内部開口が設けられる部分の角度Fを180°以上としているため、インクの付着を効果的に防止している。

【0039】好適な例としては、図4(c)に示したように開口を室11の中央側に突出させ、これに隣接する

ように鋭角の隅部を設けることにより、より一層内部開口にインクが到達し難い構成となる。

【0040】前述したように、インクトラップ室またはバッファ室に設けられる隅部の角度は、様々考えられるが、インクカートリッジに収容されるインクの表面張力や粘度等から好適な角度及び間隔、設けられる数等を設定することになるのは言うまでもない。

【0041】以下、上述のインクカートリッジが用いられる装置について説明する。

【0042】図5は、本発明に係わるインクカートリッジ1が搭載可能なインクジェット機録装置の一例としての概略斜視図であり、1は前述したインク収容部であるインクカートリッジであり、HCはインクカートリッジ1とインク吐出部を有する記録手段である記録ヘッドカートリッジ5001を着脱可能に保持するキャリアジである。

【0043】5004はキャリアジHCを記録紙やプラスチック薄板等の被記録媒体5006に対して走査させるためのリードスクリュウであり、5003はキャリアジHCの走査を案内するためのガイドレールである。ここで、リードスクリュウ5004はギア5009及び5011を介して駆動モータ5013の正逆回転に連動し、さらに、リードスクリュウ5004に刻まれた螺旋溝5005がキャリアジHCに設けられた不図示の係合部と係合しているため、キャリアジHCの走査は駆動モータ5013の駆動によって装置の長手方向に行われることになる。そして、被記録材5006は、プラテンローラ5000によって搬送される。

【0044】また、被記録材5006の搬送領域に隣接して、吐出部の回復手段が設けられる。この回復手段は、前記記録ヘッドカートリッジの吐出口部(不図示)をキャッピングするためのキャップ部材5002と、このキャップ部材5002に設けられた内部開口(不図示)を介して吐出部を吸引回復する吸引手段5012からなる。この吸引手段には、ギア5010及び切り替えクラッチ等の公知の伝達手段により、駆動モータ5013から駆動力が伝達される。

【0045】さらに、上述の吸引回復処理は吐出口の目詰まり等の回復だけでなく、吸引量を変化させることにより、インクカートリッジから吐出部までのインクを排出させて微細なゴミや気泡等をフィルター部だけでなくインク流路内から除去することも可能である。このインク流路の回復処理は定期的に、またはユーザーが必要と判断した場合に強制的に行われるものであり、良好な印字品位を維持することが可能となる。

【0046】前述のキャッピング及び吸引回復の各処理は、キャリアジHCがホームポジション側の領域に来たときに、それぞれの対応位置で行われることになる。そして、これらの各処理は周知のタイミング及びシーケンスを利用して任意の態様で、単独または複合的に実施さ

れる。

【0047】

【発明の効果】以上説明したように本発明の構成を採用することにより、環境変化等によりインクを保持する部材からインクがにじみ出したとしても、大気連通部にインクを滞留させる機構を設けているため、インクカートリッジの外表面に設けられている大気連通口にインクが到達する可能性を低いものとできる。

【0048】また、インクカートリッジが任意の姿勢で載置されてもインクを滞留させることが可能となる。

【0049】そして、仮に振動、落下、熱衝撃、温度変化によって、負圧調整のためにインクを保持する吸収部材からインクがにじみでて、インクトラップのための室の内壁にインクが付着したとしても、大気連通口に連通する大気連通路内にインクが侵入する確率を低いものとできるので、インクがインクカートリッジの大気連通口から漏れて周囲を汚損する可能性をより低いものとすることができる。

【図面の簡単な説明】

【図1】(a)(b)は本発明に係わる第1の実施例としてのインクカートリッジの断面図

【図2】(a)(b)は本発明に係わる第2の実施例としてのインクカートリッジの断面図

【図3】(a)(b)(c)は図2に示した大気連通部にインクが侵入した際の拡大断面図

【図4】(a)(b)(c)は本発明に係わる他の大気連通部の形状を示した断面図

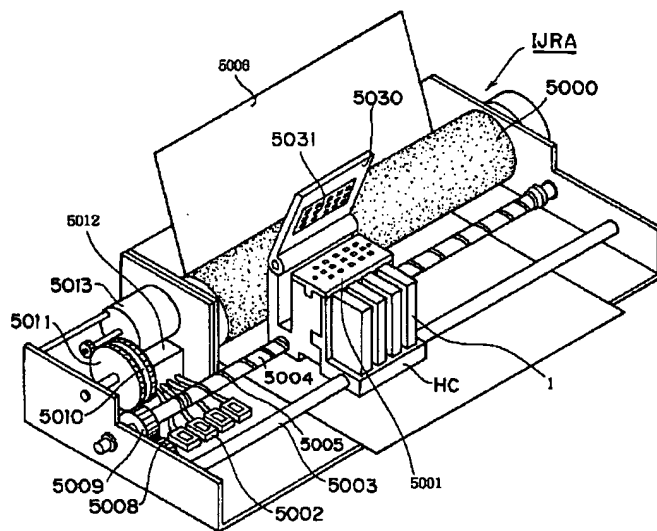
【図5】本発明を適用可能なインクジェット記録装置の

一例を示す概略斜視図

【符号の説明】

- 1 インクカートリッジ
- 2 負圧発生室
- 3 インク貯留室
- 4 吸収部材
- 5 連通部
- 6 大気連通部
- 7 インク供給口
- 8 内部開口
- 9 連通路
- 10 連通路
- 11 室
- 12 大気連通口
- 13 開口
- 14 インク
- 5000 プラテンローラ
- 5001 記録ヘッドカートリッジ
- 5002 キャップ部材
- 5004 リードスクリュー
- 5005 螺旋溝
- 5006 被記録材
- 5009 ギア
- 5011 ギア
- 5012 吸引手段
- 5013 駆動モータ
- HC キャリッジ

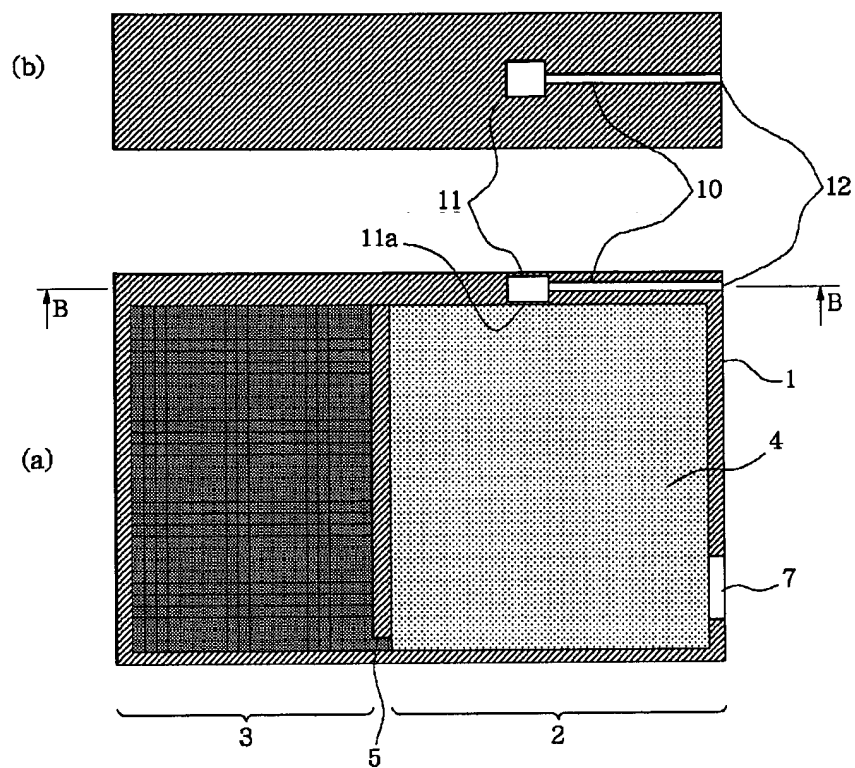
【図5】



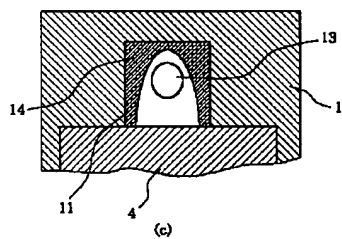
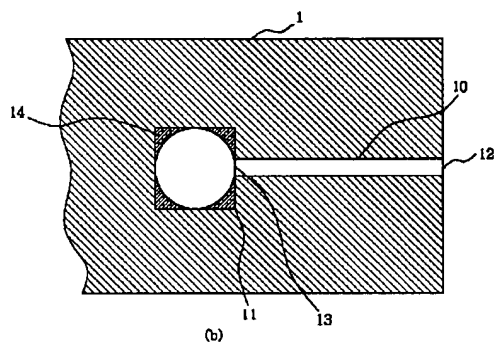
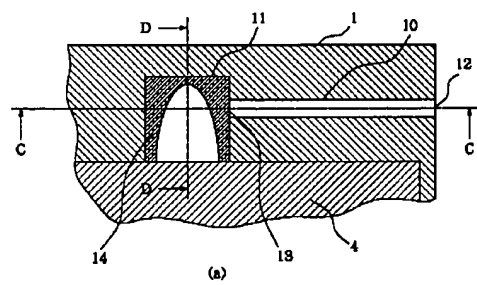
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【図2】



【図3】



【図4】

